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Diversification and value addition

Note by the UNCTAD secretariat

Executive summary

This note outlines the challenges faced by commodity-dependent countries that are vulnerable to volatile commodity export prices. The note discusses the reasons why commodity dependence can have negative effects on growth and development in a country and identifies which individual commodities and commodity groups display the most volatile prices. Based on the classification of 191 countries into different commodity export dependence groups, and the level of concentration of each country's exports, the note finds a statistically significant relationship between concentration, the level of development (as proxied by country group) and the type of commodity each country exports. This indicates that the type of commodity dependence matters for development. The note concludes with a brief discussion of horizontal and targeted policy measures to foster economic and export diversification in commodity-dependent countries.

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I. Introduction

1. The Nairobi Maafikiano (TD/519/Add.2, paragraph 57) emphasizes the importance of economic diversification into modern, sustainable and more technologically advanced productive activities, as well as the production of higher value products. This is considered essential for sustainable long-term growth and for building resilience to the shocks that periodically affect the economic performance of developing countries and countries with economies in transition. Diversification is particularly important for the most vulnerable developing countries, such as small island developing States and the least developed countries. More generally, diversification and value addition are vital for commodity-dependent countries,[1] given their vulnerability to volatile commodity prices (see TD/519/Add.2, paragraph 59).

2. In the areas of economic and trade diversification, as well as value addition, the Nairobi Maafikiano (TD/519/Add.2, paragraph 76) and the Trade and Development Board of UNCTAD give the Organization a strong mandate to provide statistics, analytical work and technical assistance to developing countries and countries with economies in transition. In line with this mandate, the purpose of this paper is to present an empirically based analysis of diversification and value addition, including some policy suggestions on how to achieve this objective.

II. Importance of diversification

A. Channels through which export and economic concentration affect economic performance

3. There is ample empirical evidence linking the degree of economic and export concentration and diversification with development. Production tends to become more diversified as income increases until, at a relatively high level of income, concentration starts to increase owing to specialization.[2] Also, economies tend to become more diversified as they move out of early development stages than when they are already developed.[3] With respect to the relationship between export concentration and economic development, diversification increases as income per capita grows, but after a certain level, diversification decreases again.[4] In addition to income per capita, major determinants of export concentration include a country's size (larger countries are more diversified), distance from major markets (remote countries are less diversified) and market access.[5]

4. While most empirical studies on the relationship between concentration and development have proxied economic development by the level of income, a negative relationship between concentration in the export of commodities (that is to say, commodity dependence) and the human development index has also been found. In addition, the strength of the relationship changes with the level of commodity dependence and the type

[1] UNCTAD defines commodity-dependent developing countries as those in which more than 60 per cent of merchandise exports are commodities (UNCTAD and Food and Agriculture Organization of the United Nations, 2017, *Commodities and Development Report 2017: Commodity Markets, Economic Growth and Development* (United Nations publication, Sales No. E.17.II.D.1, New York and Geneva).

[2] See J Imbs and R Wacziarg, 2003, Stages of diversification, *American Economic Review*, 93(1): 63–86.

[3] See L De Benedictis, M Gallegati and M Tamberi, 2009, Overall trade specialization and economic development: Countries diversify, *Review of World Economics*, 145(1):37–55.

[4] O Cadot, C Carrère and V Strauss-Kahn, 2011, Export diversification: What's behind the hump? *The Review of Economics and Statistics*, 93(2):590–605.

[5] A Parteka and M Tamberi, 2013, What determines export diversification in the development process? Empirical assessment, *The World Economy*, 36(6):807–826.

of commodity on which a country depends, and the negative effect is strongest in countries where commodities account for more than 60 percent of total merchandise exports.[6,7]

5. Countries with highly concentrated productive or export capabilities are vulnerable to sector-specific shocks such as a commodity price fluctuations, or a technological change that reduces demand for the products they specialize in. Under these conditions, concentration into more volatile productive sectors and export products will result in lower growth and poor development performance. In this regard, as countries develop, productive capacity moves towards less volatile sectors leading to a situation in which more developed economies are less volatile.[8] By the same token, the low and volatile economic growth rates of commodity-dependent developing countries is related to high commodity price volatility, given these economies' strong concentration in the commodity sector.[9]

6. The negative effect of concentration on economic growth and development in volatile economic sectors such as commodities is mediated through channels such as investment. The level of national income, which is volatile owing to commodity dependence, is a key determinant of both the attractiveness and feasibility of private and public investment. This makes investment procyclical and hence volatile. Higher (lower) national income[10] resulting from a positive (negative) price shock, on the one hand, increases (reduces) the expected profitability of investment, while on the other hand, relaxing (tightening) financial constraints on investment. The effect of financial constraints on public investment in infrastructure, health, education and security are particularly well documented. The stronger the concentration of a country's production and exports on a few volatile sectors, the more vulnerable investment and growth.

7. Moreover, potential investors may perceive more concentrated economies as riskier, independently of the current value of commodity prices, thereby reducing investment ex ante. Additionally, investments that take place may be limited to those with low risk levels, high discount rates and/or short maturity. As the most productive investments – for example, those associated with higher embedded technology and productivity – generally require long maturity times, concentration may reduce such investments even more than it reduces investment in general, with a negative effect on growth and development.

8. Furthermore, a vicious circle may ensue as volatility of gross domestic product growth caused by commodity dependence results in increased concentration and commodity dependence. In some cases, reductions in national income resulting from a negative shock may lead to sociopolitical instability as a Government fails to provide basic services to its population, or as a result of adjustment policies required to adapt to economic hardship. This has a negative effect on the attractiveness of investment, especially outside the natural resource sector. In addition, if total factor productivity is positively affected by learning by doing, reduced economic activity caused by lower commodity prices and lower long-term growth leads to less learning by doing. This affects productivity growth, thereby negatively affecting the capacity of the economy to diversify and develop.

[6] JD Nkurunziza, K Tsowou and S Cazzaniga, 2017, Commodity dependence and human development, *African Development Review*, 29(S1):27–41.

[7] In the literature, commodity dependence has also been associated with dependence on commodity imports or both exports and imports. This paper focuses on the export dimension of commodity dependence, based on the traditional definition of commodity dependence by UNCTAD.

[8] M Koren and S Tenreyro, 2007, Volatility and development, *The Quarterly Journal of Economics*, 122(1): 243–287.

[9] See F Van der Ploeg and S Poelhekke, 2009, Volatility and the natural resource curse, *Oxford Economic Papers*, 61(4):727–760.

[10] In addition to affecting investment, national income changes resulting from a shock may also affect consumption, prices, employment variables (for example, unemployment, informality), poverty, inequality and many other welfare-related variables. These can be considered the direct effects of a shock such as a change in commodity prices in commodity-dependent countries.

9. High concentration can lead to a persistent distortion of the relative prices of tradables and non-tradables resulting from real exchange rate overvaluation, a phenomenon known as "Dutch disease". This occurrence can explain why high concentration may lead to lower growth and development.[11] During a persistent commodity price boom, the real effective exchange rate of a country with large commodity exports may become overvalued due to higher commodity export income and – in the case of countries more closely integrated into international capital markets – procyclical capital inflows. This effect may be caused either by a nominal exchange rate appreciation, an increase in inflation or both, reducing the relative price of tradable goods and services. This persistent distortion makes the non-resource sector of such countries less competitive and attractive for investment, negatively affecting its capacity to diversify and develop. A recent empirical study found that natural resource exports have a strong negative effect on non-resource exports and a weaker positive effect on imports, in line with the Dutch disease hypothesis.[12]

10. An additional explanation of the negative effect of commodity dependence and concentration on development concerns the negative effects that natural resource windfalls may have on institutions in these countries. An extensive literature[13] describes and analyses the different forms these negative effects may take, including rent seeking and corruption, the implementation of unsustainable policies due to pressure from interest groups, political instability and deterioration in the rule of law, among others. As institutions matter for development,[14] institutional weaknesses associated with commodity dependence may partly explain developmental challenges in commodity-dependent countries.

11. Moreover, the types of products that countries diversify into are important for development, as production and export of higher value, higher quality and productivity products is strongly associated with development.[15] Higher growth and development ensues as resources move from low-productivity sectors such as subsistence agriculture and informal services towards the production of higher productivity and higher quality goods and services (structural transformation[16]).

12. The previous discussion shows that economic and export diversification is important for development, especially if such diversification reduces vulnerability to particularly volatile sectors and products such as commodities. The next section identifies the level of volatility across commodities and commodity groups, shedding light on where action in terms of economic and export diversification is needed most.

B. Price volatility across commodities and commodity groups

13. Figure 1 shows the real price volatility of 54 commodities, deflated by the World Bank manufactures unit value index. They are classified into four commodity groups: food, tropical beverages and vegetable oils (28 commodities); minerals, ores and metals (11 commodities); agricultural raw materials (12 commodities); and energy (3 commodities).

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[11] For a survey, see F Van der Ploeg, 2011, Natural resources: Curse or blessing? *Journal of Economic Literature*, 49(2):366–420.

[12] I Harding and AJ Venables, 2016, The implications of natural resource exports for non-resource trade, *IMF [International Monetary Fund] Economic Review*, 64(2):268–302.

[13] Reviews of this literature are JA Frankel, 2010, The natural resource curse: A survey, National Bureau of Economic Research Working Paper 15836, and van der Ploeg, 2011.

[14] See D Acemoglu, S Johnson, J Robinson and Y Thaicharoen, 2003, Institutional causes, macroeconomic symptoms: Volatility, crises and growth, *Journal of Monetary Economics*, 50(1): 49–123.

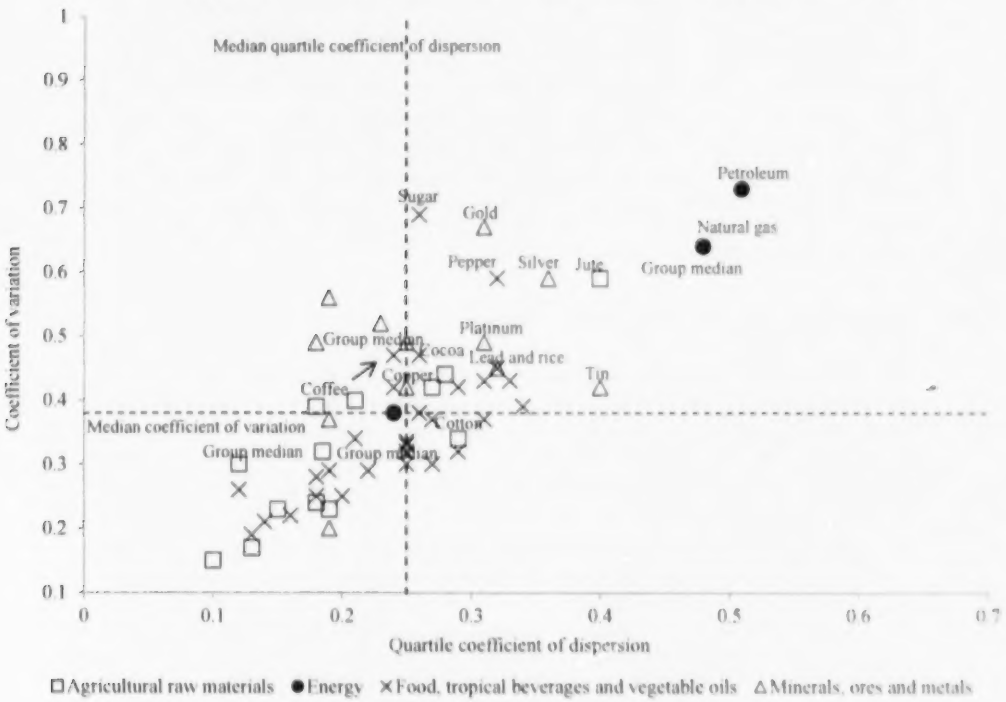
[15] See R Hausmann, J Hwang and D Rodrik, 2007, What you export matters, *Journal of Economic Growth*, 12(1): 1–25.

[16] Structural transformation can be defined in broad terms as the movement of labour from low-productivity sectors of the economy into high-productivity ones. See B Herrendorf, R Rogerson and A Valentinyi, 2014, Growth and structural transformation, in P Aghion and S Durlauf, *Handbook of Economic Growth*, 2A: 855–941 (North-Holland, Oxford) and UNCTAD, 2014, *The Least Developed Countries Report 2014: Growth with Structural Transformation – A Post-2015 Development Agenda* (United Nations publication, Sales No. Sales No. E.14.II.D.7).

14. To account for differences in the characteristics of different volatility measures, figure 1 presents two of them: the coefficient of variation and the quartile coefficient of dispersion calculated for each of the 58 commodities for the period 1960–2016. The group median of each volatility measure is also included[17] to allow a comparison of volatility among commodity groups. During the last 56 years, real commodity prices have been volatile, and that volatility has been heterogeneous both between and within groups of different individual commodities.

Figure 1

Commodity price volatility by group, deflated by manufactures unit value, 1960–2016



Source: UNCTADstat and the World Bank.

15. The median volatilities of the energy group are the highest, with crude petroleum registering the highest volatility of all products, followed closely by natural gas. The volatility of coal is much lower. The high volatility of petroleum and natural gas, combined with the large number of energy-dependent countries (see next section), highlights the need to particularly foster diversification efforts in those countries.

16. The second-highest group median volatility is that of the minerals group, influenced in particular by the three precious metals in the group: gold, platinum and silver, which are among the most volatile commodities. Hence, countries dependent on the export of precious metals, notably gold, [18] are particularly affected by export price volatility. Other commodities within this group, whose real volatility was equal to or greater than the median of all commodities, are tin and lead.

[17] Since the group medians may overlap with an individual commodity entry, as in the case of natural gas in figure 1, the group median labels in the figure appear to the left of the corresponding point, instead of above, as for individual commodities.

[18] For example, gold is the top individual export product and represents more than one third of total merchandise exports in nine countries; in Guyana and Suriname, it represents more than 50 per cent of total merchandise exports. In Burkina Faso and Mali, gold accounts for three quarters of total merchandise exports.

17. The food group has the third-highest volatility measure. Within this group, some individual products are especially volatile, such as pepper, sugar and rice, but also subgroups, such as vegetable oils – especially, high-lauric acid coconut oil and palm kernel oil – and two tropical beverages, cocoa and coffee. While this underlines the importance of diversification for the countries that are reliant on these products, it also points out the challenge posed to food security for countries that are large consumers of volatile staples such as rice.

18. The agricultural raw materials group has the lowest volatility. There is, however, significant dispersion within the group. Compared with wool, cotton and rubber, jute is the most volatile product. Cotton, which is of particular export importance for several countries,[19] is one of the most volatile commodities within this group. In these countries, policies facilitating value addition to climb the value chain towards fabrics and textile exports could be a way of reducing the risks associated with the volatility of cotton prices.

19. In summary, the heterogeneous nature of price volatility across commodity groups shown in figure 1 shows that not all commodity-dependent countries are affected by volatility equally. Although diversification and value addition are relevant for all commodity-dependent countries, they bear particular importance for countries specializing in the production and export of the most volatile commodities, for example, petroleum, gold, rice, cocoa, coffee and cotton.

III. Nature of commodity dependence

20. The previous section discussed the hypothesis that the concentration of a country in the production and export of a limited number of commodities has a negative impact on development, particularly when such concentration is on volatile products such as primary commodities. In this section, a series of stylized facts on commodity export concentration and commodity dependence are presented, using disaggregated export data for 191 countries for the year 2016.

21. In particular, two empirical findings are discussed, one in each subsection. The first finding refers to which countries are commodity dependent and to which group of products these countries depend on based on their top exports. The second finding concerns the measure of overall export concentration and finds a statistical relationship between the level of overall export concentration and the following factors: the income group to which a country belongs (developed countries, least developed countries and other developing countries or countries with economies in transition) and the group of commodities they export (for example, energy).

A. Classification of export commodity-dependent countries

22. Export data for 191 countries disaggregated at three digits of the Standard International Trade Classification, Rev.3 obtained from UNCTADstat are used to assess commodity export dependence. The dataset contains data for 39 developed countries, 17 countries with economies in transition and 135 developing countries, 46 of which are classified as least developed countries.[20]

23. Export shares are sensitive to commodity price movements and vary significantly for commodity-dependent countries, according to whether commodity prices are high or low during the measurement period. Therefore, the classification of countries according to their level of export dependence was based on whether or not a country's product share of

[19] Least developed countries such as Benin, Burkina Faso, the Central African Republic and Mali.

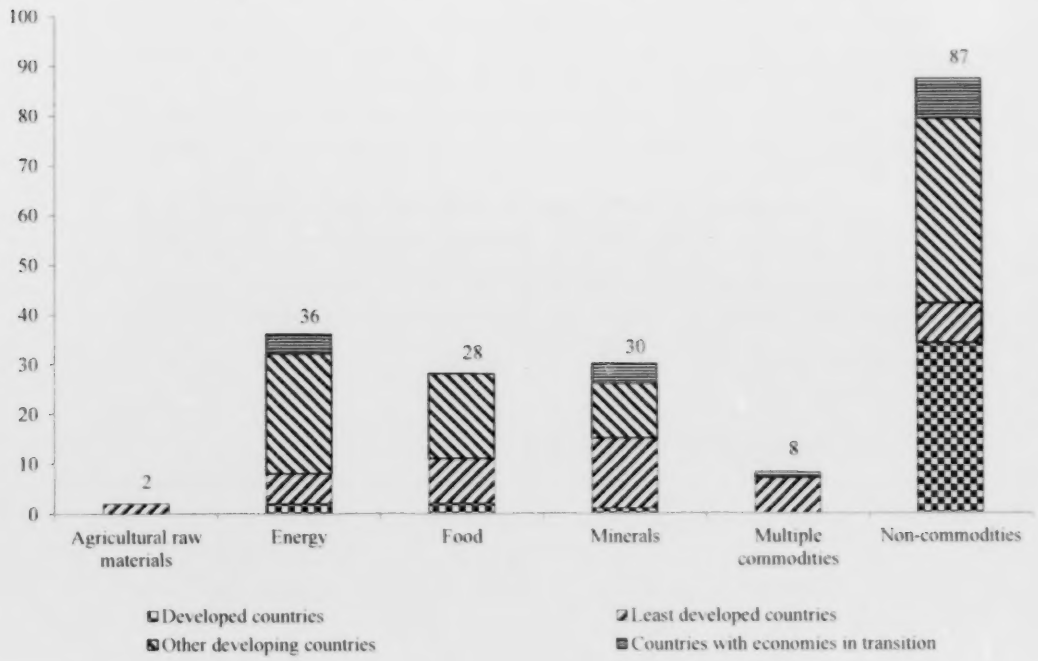
[20] Data were not available for South Sudan. The full list of least developed countries is available at http://unctad.org/en/pages/ALDC/Least%20Developed%20Countries/UN-list-of-Least-Developed-Countries.aspx (accessed 7 February 2018).

exports[21] to all trading partners between 2013 and 2016 was at least 60 per cent of total merchandise exports. As a result, 104 countries were identified as export commodity-dependent, 5 of which were developed countries, 9 were countries with economies in transition and 90 were developing countries. In the latter group, 38 countries are least developed countries. The remainder of the countries, classified as non-commodity-dependent countries, included 34 developed countries, 8 countries with economies in transition and 45 developing countries, including 8 least developed countries.

24. Subsequently, using the UNCTAD classification of commodities into groups,[22] the exports of each commodity-dependent country (that is, those with at least 60 per cent of merchandise exports made up of commodities) were classified according to whether they were dominated by agricultural raw materials; food, tropical beverages and vegetable oils and fats (food); minerals, ores and metals (minerals); or energy. Countries where one group of commodities represented at least 33 per cent of total merchandise exports during the period were considered to be dependent on that product group.[23]

25. The results of the classification by export commodity group are presented in figure 2 and in table 1. Eight countries were found where commodity exports were larger than 60 per cent of the total but where no individual commodity group reached 33 per cent of exports. They were classified as multiple commodity-dependent countries.

Figure 2
Countries by commodity dependence and income group, 2013–2016



[21] Available disaggregated trade data pose a challenge, as it is likely that several items registered as exports may be re-exports, given that a country does not produce a given commodity. One example among many is Switzerland, which is registered in the data as a large exporter of gold, though it has no gold mines.

[22] See UNCTAD, 2016, *State of Commodity Dependence 2016* (United Nations publication, Sales No. E.17.II.D.9, New York and Geneva).

[23] In seven countries, more than 33 per cent of their exports were concentrated in two product groups. In those cases, they were considered to be dependent on the larger of the two groups.

26. Setting out information in figure 2 by country income group provides more details on the interaction between the level of development and the type of commodities on which countries are dependent.

Table 1
Countries by commodity dependence and income group, 2013–2016

Country group	*Agricultural raw materials*	*Energy*	*Food*	*Minerals*	*Multiple commodities*	*Non-commodities*
Developed countries	0	2	2	1	0	34
Least developed countries	2	6	9	14	7	8
Other developing countries	0	24	17	11	0	37
Countries with economies in transition	0	4	0	4	1	8

27. Figure 1 and table 1 suggest a relationship between commodity dependence and development, as discussed in section I. While only 5 of the 39 developed countries in the sample (12.8 per cent) are commodity dependent, more than half of the countries with economies in transition and two thirds of developing countries are commodity dependent. For the least developed countries group, this figure is even higher, at 82 per cent.

28. Using data for 2016 from UNCTADstat, table 2 shows that for the 36 countries where energy exports represent more than one third of total merchandise exports, 6 are least developed countries.

29. Crude petroleum is the leading export in 24 countries, followed by natural gas in 6 countries. The share of crude petroleum is larger than two thirds of total exports in 8 countries and larger than half of total exports in 17 countries, indicating their high vulnerability to the volatility of a single commodity. The table also contains countries that are not primarily energy producers but that refine and export energy products (Greece) or store and re-export petroleum products (Saint Lucia). Greece and Norway are the only developed countries in table 2.[24]

Table 2
Energy-dependent exporting countries, 2016

	Commodity group							
Country or territory	*Food, tropical beverages and vegetable oils*	*Agricultural raw materials*	*Minerals, ores and metals*	*Energy*	*Total commodities*	*Non-commodities*	*Leading product*	*Share (percentage)*
Angola	0.2	0.0	2.3	97.4	100.0	0.0	Crude petroleum	95.9
Algeria	1.1	0.0	0.3	95.3	96.7	3.3	Crude petroleum	37.8
Iraq	0.2	0.1	4.6	94.8	99.8	0.2	Crude petroleum	94.0

[24] Greece appears in table 2 because between 2013 and 2016, 35.3 per cent of its exports were energy products, although the figure fell to 28.1 per cent in 2016, owing to lower energy prices.

Country or territory	Commodity group: Food, tropical beverages and vegetable oils	Agricultural raw materials	Minerals, ores and metals	Energy	Total commodities	Non-commodities	Leading product	Share (percentage)
Brunei Darussalam	0.4	0.1	0.5	91.2	92.3	7.7	Natural gas	52.5
Nigeria	4.3	1.3	2.0	89.2	96.9	3.1	Crude petroleum	74.5
Qatar	0.0	0.0	2.6	87.9	90.6	9.4	Natural gas	31.7
Equatorial Guinea	0.1	5.9	0.1	86.6	92.7	7.3	Crude petroleum	68.0
Kuwait	0.6	0.4	0.7	85.2	86.8	13.2	Crude petroleum	62.2
Turkmenistan	0.7	4.9	1.0	84.9	91.5	8.5	Natural gas	74.0
Azerbaijan	5.7	0.4	5.2	79.8	91.1	8.9	Crude petroleum	69.1
Gabon	1.2	8.0	5.4	79.4	94.0	6.0	Crude petroleum	77.2
Timor-Leste	13.3	0.4	0.8	79.4	93.9	6.1	Crude petroleum	54.9
Venezuela (Bolivarian Republic of)	2.7	0.1	3.8	76.9	83.6	16.4	Crude petroleum	61.6
Chad	1.8	8.1	12.5	75.6	98.1	1.9	Crude petroleum	74.5
Libya	0.6	0.2	17.2	72.8	90.9	9.1	Crude petroleum	53.9
Congo	0.4	3.0	12.2	71.4	86.9	13.1	Crude petroleum	67.3
Iran (Islamic Republic of)	5.1	0.4	5.1	71.2	81.7	18.3	Crude petroleum	63.1
Saudi Arabia	2.1	0.1	2.4	70.4	75.0	25.0	Crude petroleum	60.9
Oman	5.8	0.1	5.2	69.3	80.3	19.7	Crude petroleum	52.2
Sudan	6.9	1.4	26.8	62.9	98.1	1.9	Crude petroleum	61.6
Kazakhstan	5.7	0.3	15.6	60.8	82.4	17.6	Crude petroleum	52.7
Russian Federation	7.0	3.1	10.1	56.1	76.3	23.7	Crude petroleum	30.7
Norway	13.5	0.9	6.6	55.1	76.1	23.9	Crude petroleum	26.5

Country or territory	Commodity group: Food, tropical beverages and vegetable oils	Agricultural raw materials	Minerals, ores and metals	Energy	Total commodities	Non-commodities	Leading product	Share (percentage)
Saint Lucia	15.6	0.2	4.4	53.1	73.4	26.6	Petroleum oils	53.0
Trinidad and Tobago	3.2	0.1	2.6	49.7	55.6	44.4	Natural gas	24.8
Cameroon	21.3	18.0	6.4	47.8	93.5	6.5	Crude petroleum	40.2
Colombia	17.4	4.7	6.6	47.5	76.2	23.8	Crude petroleum	26.0
Aruba (Netherlands)	23.1	0.1	15.1	44.1	82.5	17.5	Petroleum oils	39.9
Democratic People's Republic of Korea	9.6	1.0	11.8	44.1	66.5	33.5	Coal	42.7
Bahrain	4.0	0.1	22.9	42.4	69.4	30.6	Petroleum oils	29.4
Yemen	22.2	0.7	30.6	39.3	92.9	7.1	Gold	28.9
Ecuador	51.4	6.0	2.6	32.7	92.8	7.2	Crude petroleum	30.1
Bolivia (Plurinational State of)	20.5	0.7	40.1	32.6	93.9	6.1	Natural gas	28.3
United Arab Emirates	5.3	0.3	27.0	31.9	64.5	35.5	Crude petroleum	19.1
Myanmar	37.3	2.5	6.1	28.5	74.5	25.5	Natural gas	27.5
Greece	23.2	2.0	8.9	28.1	62.1	37.9	Petroleum oils	26.7

Note: Countries are listed in order of energy dependence (see column 5, Energy).

30. Export shares of the 30 countries identified as exporters of minerals, ores and metals show that 14 are least developed countries located in Africa. The only developed country in the group is Australia, a major exporter of iron ore and its concentrates. Gold is the leading product exported by 11 countries, followed by copper and copper concentrate, which together are exported by 7 countries, including exporters such as Chile, the Democratic Republic of the Congo and Peru. Iron ore and concentrates are the dominant exports in three countries, while aluminium and aluminium ore and concentrates, respectively, are the main commodity exports in two countries each. Diamonds are the top export product in Botswana and Namibia.

31. In addition to the developing countries identified as mineral-dependent countries where gold is the main export, other leading exporters of precious metals are Guinea (gold, 29.2 per cent of exports), Peru (gold, 17.8 per cent of exports), South Africa (gold, silver, platinum and platinum group, 13.2 per cent of exports) and Zimbabwe (gold, 17.9 per cent of exports). Papua New Guinea has a 5.8 per cent share of silver, platinum and platinum

group exports to add to the 20 per cent share of gold exports. This is important to highlight, as section II showed that the prices of precious metals are among the most volatile, together with petroleum and gas.

32. In 28 countries, more than one third of their merchandise exports is composed of food, tropical beverages and vegetable oils and fats. Nine are least developed countries. The top products exported by these countries vary widely; fish (five countries) and fruits (three countries) are the only top products exported by more than two countries. Of the five fish exporters, all of which are small island developing States, those that export fresh or frozen fish (Kiribati, Maldives, the Federated States of Micronesia and Palau), at least three quarters or more of their goods exports in 2016 were concentrated on that item, while half of the exports of Seychelles were concentrated on prepared fish. Many of the countries dependent on the export of food had a more diversified export structure than most of those dependent on energy and minerals.

33. Some are significant exporters of particularly volatile commodities within the foods group. For Belize (38.3 per cent of exports) and Cuba (21.7 per cent), sugar is the top export, while Swaziland and Mauritius also have export shares of sugar larger than 10 per cent. For Brazil, the world's largest sugar producer, that share is 5.8 per cent of exports. In Guyana, rice represents 10.1 per cent of total exports, another volatile commodity. Cocoa is the top export product of Sao Tome and Principe (61.5 per cent of total exports) and Côte d'Ivoire (38.2 per cent). It is also a major export of Ghana (18.4 per cent), Cameroon (13.2 per cent) and Liberia (11.3 per cent). Coffee appears as the leading export of Ethiopia (19.3 per cent of exports) and Uganda (16.1 per cent), but constitutes more than 10 per cent of the exports of Burundi (19.5 per cent), Honduras (14.7 per cent), Timor-Leste (12.6 per cent) and Rwanda (11.2 per cent).

34. Two countries depend on the export of agricultural raw materials: the Central African Republic and Solomon Islands, both exporters of wood and, in the case of the former, also cotton.

35. Eight commodity-dependent countries, seven of which are least developed countries, have relatively diversified exports among the different commodity groups, with no group representing one third of total merchandise exports. Only three countries have top product shares larger than 20 per cent.

36. Finally, this review of the top products exported by commodity-dependent countries also indicates that 36 of the 38 commodity-dependent least developed countries included in the analysis have a primary commodity (at three digits) representing more than 15 per cent of total exports and that in 28 least developed countries, this primary commodity accounts for more than one quarter of total exports. This implies that commodity dependence is coupled with strong export product concentration in many of the least developed countries.

B. Commodity dependence, export concentration and economic performance

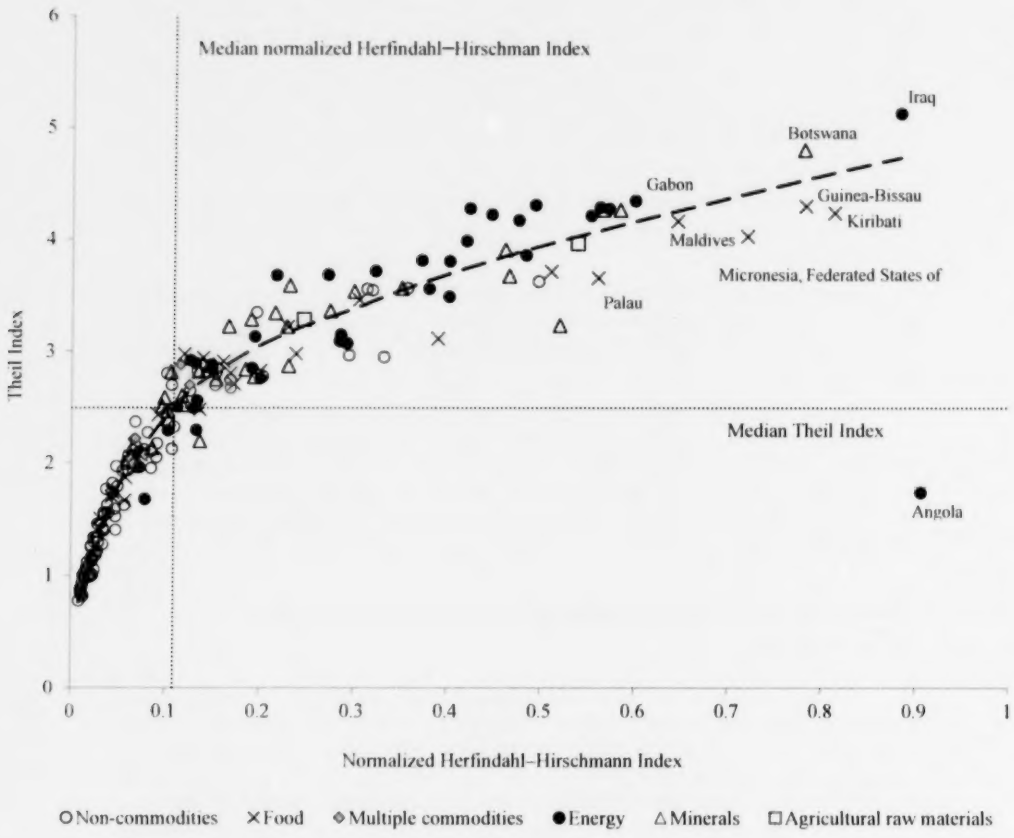
37. Different measures have been used in the economics literature[25] to assess the degree of export concentration. Two of the most widely used synthetic measures of concentration for a given time period are the normalized Herfindahl–Hirschmann Index and the Theil Index. The former adds up the square of the share of each product line in total exports, and it is normalized to take values between 0 and 1, where values close to 0 mean low concentration and values close to 1 mean high concentration. Unlike the normalized Herfindahl–Hirschmann Index, the Theil Index measures export concentration using a weighted average of the ratios of individual export lines to the mean value of total exports.

[25] See O Cadot, C Carrère and V Strauss-Kahn, 2013, Trade diversification, income and growth: What do we know? *Journal of Economic Surveys*, 27(4):790–812.

The Theil Index is not limited to values between 0 and 1. Therefore, both indices measure concentration in a country's exports but in different ways, complementing each other.[26]

38. Using the same dataset as above, the normalized Herfindahl–Hirschmann and Theil indices are calculated for the 191 countries, for the year 2016. The results are shown in figure 3, which presents a scatter plot of the concentration indices for all countries, classified according to what commodity group they are dependent on. Each commodity group in the figure is shown with a different symbol. The dotted curve is the fitted line representing the non-linear relationship between both concentration measures,[27] while the vertical and horizontal lines indicate the sample medians of each concentration measure. The non-linear relationship between the two concentration measures becomes more marked as concentration levels increase, and there are countries such as Angola that appear as very concentrated with one index but not with the other. This confirms the relevance of employing two indices that offer complementary perspectives on export concentration.

Figure 3
Export concentration indices, 2016



[26] A technical discussion of the advantages, disadvantages and characteristics of these and other concentration indices is available in N Palan, 2010, Measurement of specialization: The choice of indices, Working Paper 62, Research Centre International Economics (Forschungsschwerpunkt Internationale Wirtschaft, FIW).

[27] The relationship was calculated by estimating a local regression between the normalized Herfindahl–Hirschmann and Theil indices, using half the data as the span parameter.

39. Figure 3 shows that countries can be classified according to whether their concentration measures are both smaller than the median (that is to say, the countries fall into the lower left quadrant of the figure) or whether at least one concentration measure is equal or larger than the median (they fall in the other three quadrants).

40. Figure 3 highlights the following points: First, overall export concentration seems to be highly correlated with commodity dependence. Of the 90 countries that are less concentrated (those in the lower left quadrant), 69 countries (76.7 per cent) are not commodity dependent, while 83 of the 101 countries that have more concentrated exports (82.2 per cent) are commodity dependent.

41. Second, there seems to be a strong correlation between a country's development level and the degree of export concentration, as discussed previously. Thirty-four of the 39 developed countries (87.2 per cent) in the dataset are less concentrated, while 40 out of 46 least developed countries (87 per cent) are among the more concentrated country group.

42. Third, dependence on some commodity groups would appear to be associated with higher export concentration. Thirty-three out of 36 countries (91.7 per cent) classified as energy dependent, as well as 27 out of 30 countries (90 per cent) classified as minerals dependent, are in the group of more concentrated countries. In contrast, food-dependent countries seem in general to be less concentrated than energy countries, with the exception of some least developed countries such as Guinea-Bissau and Kiribati, and small island developing States such as the Federated States of Micronesia. Also, the multiple commodity-dependent countries have in general low concentration levels, similar to those of many non-commodity exporters (see paragraph 25).

43. A statistical test is carried out to analyse further the relationship between concentration, development level and type of commodity a country depends on, as suggested in figure 3. The main results, which are valid for both the normalized Herfindahl–Hirschmann and Theil concentration indices, are as follows:

(a) Both the level of development (proxied by country income group) and the type of product that dominates exports are significantly correlated with the level of concentration of a country;

(b) Commodity-dependent countries are on average more concentrated than non-commodity exporters, independently of the level of income;

(c) Which commodity a country depends on for its exports matters for export concentration. Energy-dependent countries are more concentrated than food-dependent countries.[28]

(d) Concentration is higher in poorer countries than in richer ones. Moreover, the least developed countries have the highest concentration measure, followed by other developing countries and countries with economies in transition.

44. These stylized facts point to a number of policy actions that may help commodity-dependent countries reduce their export concentration, and by the same token, increase their socioeconomic development. These are discussed in the following section.

IV. Policies for economic and export diversification, and value addition

45. Policies designed to address commodity dependence and export concentration must take into account country specificities, including the type of commodity a country is dependent on and the major constraints on diversification. For example, the type of diversification strategy that may be carried out in a country dependent on energy exports such as oil might be different from a strategy that is feasible in a country relying on an agricultural commodity such as cotton. While the former might wish to focus on building linkages between the enclave oil sector and the rest of the economy, the latter might

[28] Only the comparison between the energy and food groups was found to be significant.

consider adding value to cotton lint as the most relevant strategy to produce cotton fabrics and clothes for final consumption.

46. These policies may nevertheless be grouped into two broad categories:

(a) Horizontal policies that aim at generating the overall economy-wide conditions that are needed for diversification and value addition to occur;

(b) Targeted policies that are specifically directed at industries, sectors or products in order to promote these objectives.

A. Horizontal policies

47. There is agreement that successful diversification requires human and physical capital accumulation, including infrastructure; the improvement of science and technology capabilities; and the strengthening of institutions and governance. Commodity-dependent countries are generally advised to use the rents obtained from the export of natural resources to build capacities in these areas. Hence, investing in education, health, infrastructure and security; strengthening the rule of law and investor and consumer rights; fostering government transparency and efficiency; and improving the ease of doing business may contribute to productivity increases, diversification and value addition across the economy.

48. Diversification requires macroeconomic stability. This involves implementing macroeconomic policies, especially fiscal and monetary policies that ideally mitigate fluctuations in macroeconomic variables such as gross domestic product, inflation, exchange rates and others, or at the minimum do not contribute to instability. First, a country needs to reduce volatility in public revenue and expenditure. This is a challenging objective, given limited public revenue in many commodity-dependent countries,[29] large demands on Government for the provision of goods and services, and the volatile nature of revenue associated with commodity price volatility, as well as the resulting volatility of national income. Therefore, proper management of fiscal policy during commodity upward cycles is key to building fiscal space for use during the future downward part of the commodity cycle.

49. Specific policy tools that may help to stabilize public revenue and/or expenditure include the effective use of multi-year budgets, a practice adopted in many countries and which has proven its worth in relation to fiscal performance.[30] Also, it is important to carefully manage sovereign funds, in the interest of income stabilization and intergenerational equity, where relevant. The Pula Fund (Botswana) and the Social and Economic Stabilization Fund (Chile) are cases in point. Implementing binding fiscal rules of different types, including balance rules, expenditure rules and debt rules, could be another avenue for the improvement of fiscal management.[31] Indeed, it has been shown that the use of fiscal rules had a stabilizing role for fiscal policy in Latin America.[32] Furthermore, when possible, leveraging public expenditure in capital formation by mobilizing private investment in infrastructure, for example through the use of public–private partnerships, could be useful.

50. Second, for commodity-dependent countries where monetary policy is an effective policymaking instrument, it can be a powerful tool in the drive towards economic and export diversification and value addition. Such a policy would contain the following four important components:

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[29] Reasons for this include narrow tax bases, limited institutional capacity for tax enforcement, political economy factors and illegal financial flows.

[30] See R Vlaicu, M Verhoeven, F Grigoli and Z Mills, 2014, Multi-year budgets and fiscal performance: Panel data evidence, *Journal of Public Economics*, 111(C):79–95.

[31] See V Lledó, S Yoon, X Fang, S Mbaye and Y Kim, 2017, Fiscal rules at a glance, International Monetary Fund, March.

[32] E Alberola, I Kataryniuk, A Melguizo and R Orozco, 2017, Fiscal policy and the cycle in Latin America: The role of financing conditions and fiscal rules, Organization for Economic Cooperation and Development Centre Working Paper No. 336.

(a) Attaining a low and stable inflation rate. This reduces uncertainty about future prices, facilitating investment planning that could foster diversification and value addition. Countries with flexible exchange rate regimes such as Chile, Colombia and Peru, with help from sustainable fiscal policies, have successfully attained low and stable inflation rates;

(b) Stabilizing economic activity in the face of a shock. Private investment, especially investment in higher productivity sectors that often have a longer maturity period or higher sunk costs, benefits from more stable national income and other macroeconomic aggregates. This can be particularly important when fiscal policy cannot act in a countercyclical way, as is the case in many commodity-dependent countries, especially in the least developed countries;

(c) Reducing exchange rate volatility. Exchange rate volatility makes the ex ante expected profitability of firms riskier through mechanisms such as balance sheet effects (for example, when debt is denominated in foreign exchange) and increases risk in future input and output prices, including the cost of financing, capital and imported intermediate goods and services. For commodity-dependent countries, including middle-income countries such as those in South America, integration into international capital markets increases fluctuations in the exchange rate as a result of commodity price movements. This raises the cost of reducing exchange rate volatility. Hence, during the last commodity price boom, several countries implemented measures that restricted some types of capital inflows, especially short-term ones, for example through taxation. This was the case in Brazil.[33] Countries such as Peru have succeeded in reducing exchange rate volatility using tools such as direct market intervention, derivatives, macroprudential measures and expectations management;

(d) Contributing to the stability of the financial sector by using macroprudential policies, especially for countries that are more integrated into international capital markets. For example, Brazil has used financial transaction taxes and unremunerated reserve requirements to address large short-term capital inflows.

51. In practice, it is difficult to harmonize these different components of monetary policy. Therefore, modern central bank practices in developing countries, especially in countries that have commodity currencies, vary in terms of which objectives are explicitly and implicitly acknowledged as being pursued, and in which order of priority, taking into account each country's specific circumstances. For example, the flexibility provided by fiscal policy and the magnitude and type of shocks, as well as sociopolitical factors, are important determinants of what type of monetary policy is pursued de facto.

52. The use of monetary policy as a stabilizing tool requires a sufficient degree of monetary policy independence, implying the absence of complete fiscal dominance and the pursuit of a sufficiently flexible de facto exchange rate regime. Where these conditions are not met, fiscal policy becomes the only stabilizing tool, reinforcing the need for a sustainable fiscal policy for stabilization and setting the stage for diversification and development.

53. A third type of horizontal policy involves minimizing exchange rate overvaluation. This requires a concerted effort going beyond central banks and involving, in particular, the fiscal authorities. Reserve accumulation can be costly,[34] and therefore should be only one tool among others that directly address the sources of overvaluation. Others could include sovereign funds that accumulate foreign exchange and measures to manage capital movements, such as taxes and mandatory deposits. Importantly, policy action should balance the expected effects of overvaluation on diversification, growth and development with the expected cost of measures put in place to address it.

[33] See K Habermeier, A Kokenyne and C Baba, 2011, The effectiveness of capital controls and prudential policies in managing large inflows, International Monetary Fund Staff Discussion Note SDN/11/14, August.

[34] These costs include the actual quasi-fiscal cost of acquiring reserves, its opportunity cost, and reputational risks to the credibility of central banks in pursuing the objectives mentioned above.

B. Targeted policies

54. Diversification can also benefit from properly designed and implemented public policies that target specific market failures. A review[35] of the theory and the empirical experience around the world with targeted policies, also known as industrial policies, indicates that a successful implementation that balances risks and benefits is a delicate task. It requires, on the one hand, avoiding the pitfalls of discretionary sectoral policies that often fail due to rent seeking and corruption; dropping "losers", despite existing sociopolitical costs; and effectively identifying sectors with high spillovers in the country. On the other hand, proper implementation of targeted policies requires capacity to target existing problems and solving them in a welfare-improving way, especially in countries with limited institutional capacity. Importantly, targeted policies may strengthen the existing set of complex extant capabilities available in a country, given its existing productive structure.[36]

55. Targeted policies play two major roles. The first involves addressing coordination problems. These appear when a sector or industry sees its capacity to expand and add value hindered by challenges upstream or downstream in the value chain such as lack of availability or quality of necessary inputs, or issues with potential buyers such as their location and size, and horizontal constraints such as the number and size of competitors (economies of agglomeration and scale).

56. Coordination problems can be addressed by different means, such as fostering foreign direct investment in specific areas of the value chain, strengthening business associations that focus on sectoral competitiveness and moving up the quality ladder, facilitating technology acquisition or innovation to address specific challenges. Overall, this requires working closely with the private sector, including business associations, cooperatives and other entities that help identify specific market failures hindering sector growth and diversification.

57. For example, the Malaysian Palm Oil Board instituted a yearly prize for innovative products in the industry, which includes new machinery specifically targeted at increasing productivity under local conditions. Among many achievements, this has led to the introduction of different machines, such as mechanized palm cutters.[37] Other agricultural machinery specifically adapted to local circumstances have also been invented, increasing productivity in the Malaysian palm oil sector and fostering backward links with the equipment manufacturing industry, a form of diversification.

58. Another means of addressing coordination problems is by targeting the provision of public goods and services to deal with a particular sectoral problem, such as infrastructure projects, cluster-support measures and the setting up of export-processing zones.

59. The second major role of targeted policies concerns addressing the process of profitability discovery problems. Before entering a new market, potential investors do not know how profitable a new activity will be; therefore, they must incur sunk, upfront costs in order to "discover" these profits.[38] However, once the new activity is found to be profitable, it attracts new entrepreneurs and more competition, which may lower profits. Therefore, this reasoning results in insufficient market entry, ex ante. Government interventions may include setting up an export promotion agency, rural extension services and other measures that reduce informational asymmetries.

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[35] A Harrison and A Rodriguez-Clare, 2010, Trade, foreign investment, and industrial policy for developing countries, in D Rodrik and M Rosenzweig, eds, *Handbooks in Economics: Development Economics*, 5: 4039-4214 (North-Holland, Oxford).

[36] R Hausmann and CA Hidalgo, 2011, The network structure of economic output, *Journal of Economic Growth*, 16(4):309–342.

[37] See http://www.mpob.gov.my/en/technologies-for-commercialization/achievements and http://palmoilis.mpob.gov.my/tot/index.php/select-year/55-new-technologies-2017/new-technology-transfer/887-tt-no-613-battery-powered-oil-palm-harvesting-tool (accessed 9 February 2018).

[38] See R Hausmann and D Rodrik, 2003, Economic development as self-discovery, *Journal of Development Economics*, 72(2):603–633.

60. Both export promotion agencies and rural extension services can increase access to available market opportunities to potential producers and provide valuable information that can foster diversification. Export promotion agencies may be particularly useful in efforts to differentiate agro-industrial products according to the needs of specific foreign markets with respect to tastes and packaging, for example. Furthermore, rural extension services often monitor and disseminate market prices for products and agricultural inputs such as fertilizers, and facilitate technology adoption as well. For example, in Chile, the Government maintains a free service of daily price quotations for different public markets in the country that allows farmers to rapidly determine daily prices of a variety of agricultural products, including fruits and vegetables.[39] In Argentina, the agricultural extension service[40] provides a variety of services to farmers aimed at fostering better agricultural practices and has been important in the past in the adoption of technologies such as no-till cultivation.

61. Competition policy can also be a powerful tool to foster diversification and value addition.[41] In particular, the abuse of market power upstream or downstream in a value chain may generate relative price distortions that can negatively affect diversification and value addition downstream by reducing private investment in the non-resource sectors of commodity-dependent countries. This occurs, for example, if market power raises prices of important inputs such as capital, intermediate goods or logistical services, and/or by reducing the prices obtained by producers who do not sell to final consumers. A recent example of competition policy addressing such problems was the fining (R37 million) by the Competition Commission of South Africa in July 2017 of two chemical companies for price fixing and dividing markets.[42] Another example relates to the structural and behavioural remedies applied in 2010 to the anticompetitive practices identified in the nitrogen fertilizer market.[43]

62. Targeted policies to foster diversification and value addition may focus on different policy mixes in energy and mineral-dependent countries, compared with food or agricultural raw material-dependent countries. For countries that are dependent on the export of food, tropical beverages and vegetable oils, as well as for many types of agricultural raw materials, targeted policies can, in particular, support climbing the value chain by fostering activities that are closer to existing ones in the product space (vertical integration). This implies devoting significant effort to diagnosis of the sectors and products involved, including characteristics and opportunities, identifying bottlenecks and other constraints on moving up the value chain or adding value through quality improvements and differentiation, and putting in place adequate complementary policy measures to tackle challenges such as those mentioned above.

63. As value addition to commodities such as coffee and cocoa often involve differentiation through careful quality control, traceability of inputs, the fostering of sustainable practices, and control of the value chain up to the final consumer, efforts to strengthen each of these elements by public–private cooperation are often important, as proven by the case of Colombia. The work of the National Federation of Coffee Growers of Colombia, with the support of the Colombian Government, has resulted in quality

[39] The Office of Studies and Agrarian Policies (Oficina de Estudios y Políticas Agrarias) is a dependency of the Ministry of Agriculture of Chile and provides these price quotations (http://www.odepa.cl/precios/, accessed 9 February 2018).

[40] The National Institute of Agricultural Technology of Argentina (Instituto Nacional de Tecnología Agropecuaria), established in 1956, provides a variety of services to farmers. See www.inta.gob.ar (accessed 9 February 2018).

[41] Although often considered a horizontal policy, competition policy can also be considered a targeted policy that addresses coordination problems, as it acts at the sectoral level and in a developing country with limited resources (such as government human resources), requiring de facto the prioritization of monitoring and addressing market power.

[42] See http://www.compcom.co.za/wp-content/uploads/2017/01/TWO-CHEMICAL-COMPANIES-FINED-R37M-FOR-CARTEL-CONDUCT.pdf (accessed 9 February 2018).

[43] S Grimbeek, G Giya and O Mahlalela, 2017. The impact on competition in the fertiliser industry after the Sasol divestiture of blending facilities in 2010, Competition Commission of South Africa Working Paper 1.

improvement and incremental value addition, for example, through exports of lyophilized coffee, reaching consumers directly in many different countries through the Juan Valdez coffee chain.[44]

64. Energy and mineral extraction are high capital-intensive-activities that are often enclaves, frequently in remote areas. This means that the strength of forward and backward links to industrial activities with higher value added, especially ones with low volatility, may be weaker than for food and activities related to agricultural raw materials. Therefore, for countries that are dependent on the export of energy or minerals, ores and metals, targeted policies may be especially useful when focused on the development of high-value service industries, such as exploration services, catering and legal services. For this to happen, a country needs adequate human resources. This need brings into focus the role of government in planning and coordinating activities with domestic and foreign players. For example, generating skills to meet specific sectoral needs might require cooperation with domestic and international training institutions for capacity-building purposes.

[44] See https://www.federaciondecafeteros.org (accessed 9 February 2018).